2001, A GEOSPATIAL ODYSSEY

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With the dawn of the new millennium I pause and ask myself, where do we go from here? I wish I could get a definitive answer from HAL the computer on this one. Last year we talked about data inventory systems, GIS, GPS, Infrastructure Management, Asset Management and GASB 34.With the speed that technology changes you don't need a crystal ball to prognosticate that change is inevitable. Looking back over the past ten years gives us a serious wake-up call to just how fast technology is moving. It also provides a reference for looking into the future.

Here are a few things we see in the near future that we've discussed in recent articles:

· **GASB 34** (Governmental Accounting Standards Board Statement 34) is coming, and, to some extent, it will impact every governmental agency. GASB 34 requires financial accountability in the reporting of governmental assets.

· **Asset Management** is a concept many governmental agencies are adopting. It builds on Infrastructure Management by adding the dimension of financial accountability. Whether it is money, work force, or materials, it makes good business sense to know how much you have, its current status, and how it is performing. Also, by having an Asset Management system in place, an agency will be in a position to use the "modified approach" to meet GASB 34 reporting requirements.

· **Infrastructure Management** makes good business sense for local agencies. It was defined in the last issue as "a holistic approach to managing complex infrastructure systems in order to maximize their efficiencies and resources for the benefit of all users." It provides a cohesive integration of pavement, safety, maintenance, bridge preservation, waste water, solid waste removal and other management systems.

· **GIS** (Geographic Information Systems) are great tools to use to analyze and communicate various aspects of these complex systems, and to see their relationship to other systems that share common geographical space.

· **GPS** (Global Positioning System) is another great tool for locating "things" and their relationship to a known location on the surface of the earth.

We haven't even begun to discuss things like IMS (Internet Map Serving), B2B (Business to Business), B2C (Business to Customer), Internet Portals, and optimizing web applications over your intranet and extranet systems.

What is the future for these technologies? These technologies will be getting smaller and faster, and will be constantly changing. Many of you reading this remember the Apollo lunar landing. Today, you have sitting on your desk and in your homes computers that are more powerful than the one used to put those men on the moon. Whatever the next five, ten or fifteen years hold for us; one thing is certain: Change is inevitable.

Being that I am considered by some to be a pseudo-techno guy, people ask for my advice about various technologies. Inevitably they find out that I have no crystal ball, and that I am not a prognosticator of the technological future. What I write in these articles is not even "cutting edge" technology. Most of it is tried and true, at least in the discipline that first appeared in. For example, the military has been using GPS for many

years. Some land surveyors have been using it for about ten years. Some surveyors are already on their second or third generation of equipment. Even though it was only popularized a couple of years ago for the general public, GPS has been in use for many years. I saw them put GPS on a D8 Cat a few of years ago and all of a sudden it appeared like we had new bleeding edge technology. No, what we have is a D8 Cat with GPS and a fancy interface. Both the Cat and the GPS were old technology. I find that much of the "new technology" is simply an improvement of an existing technology, an integration of existing technologies, or simply a new application for an existing technology. As in the Cat/GPS scenario, even when equipment or principles are tried and true, when they are applied in new ways there will be a learning curve to overcome in the new application.

For example, what happens when your new GPS spray rig is operating under a heavy tree canopy and you lose satellite lock? Does this mean GPS doesn't work? No, it only means that it won't work well under a heavy tree canopy. If the GPS data is important, you may need to look at other complimentary technologies such as inertial guidance systems or wait until fall when the leaves have fallen from the trees.Inertial guidance systems are modified versions of guidance systems like the ones used in rockets. They take a reading from GPS satellites and continue tracking positions using some arrangement of gyroscopes and clinometers with a timer or DMI (distance measuring instrument) until another GPS reading is obtained. If this doesn't work for you, you may be forced to use an LRS (Linear Referencing System) such as a milepost system.

What was once considered "rocket science" is now finding its way onto your desks, into your vehicles, and into your homes. A lot of the things scientists are thinking up today will in some form be our tools of tomorrow, and they will be smaller, cheaper, more powerful and disposable.

I have built several sophisticated integrated systems myself. Here are a few nuggets I have gained from my own experience in the process.

Plug and Pray

Plug & Play is an oxymoron. A more accurate name is "Plug & Pray."

Vendors will promise the world, but don't buy unless you are willing to roll up your sleeves and do some of the research and development yourself.

Buy Off the Shelf

I like to buy "off-the-shelf technology" when I can. Some "black boxes" have a lot of sophisticated technology built into them and I like to throw them away and grab a new one easily if I need to. You don't always need to know everything about a "black box" to use it, but you do need to know enough to determine when and if it is working properly in your application. For example, you don't need to know the detailed inner workings of satellite communications or cellular technology to place a call on your cell phone.

Test! Test! Test!

My motto for using "black box" technology is test, test, and test it again before full production. It may look good on the drawing board or workbench but you need to test it in the environment that it will be expected to perform in. Once it is in production it is much harder to make changes. It requires a lot of work to go back and re-do work that has already been accomplished. When you test, be sure that the results are consistent and accurate.

Not All "Black Boxes" are Created Equal

Not all “black boxes” are created equal, even if the manufacturer says they are, or even if they look the same. The one you bought six months ago may have sat on a vendors shelf for six months before you bought it, thus it may be subtly different from current versions.

Keep it Simple

Keep things as simple as possible. Although there are always fancier or more efficient ways of doing things, the added sophistication usually increases complexity and potential for integration problems.

Use Proven Tools

Choose proven rock solid applications whenever possible. I try to wait until a component has proven itself as an “industry standard” before I integrate it into a complex system. The individual components of a system tend to be in constant state of dynamic evolution. The more that you integrate complex subsystems; the more dynamic the rate of change is in the entire system. You can save yourself a lot of grief if the components you select have the “bugs” worked out already.

Hold on to Things Loosely

Since components are in constant evolution you need to be flexible. I try not to hold on too tightly to any particular component of the system. It may change tomorrow.

Keep Track of the True Age of Your System

If dog years are seven years for every human year, then “computer years” are about twenty years for every human year. A four-year-old computer is equal to an eighty-year-old human when it comes to the latest technologies. If I were managing a system that involved the integration of leading edge technologies, I would attempt to maintain the system at some level of “computer years,” say, sixty-computer years old, depending on the systems purpose. Much of this is decided by your individual budget constraints, but it should be considered in the longevity of any technological investment.

Keep Your Mind Open and Eyes Sharp

I have had some of my greatest successes from combining technologies from unrelated disciplines. In one of my recent experiments I took a series of still photographic images and stitched them together to form a 360-degree panoramic view. The software was easy to use and I got a free download from the web. Next I used GPS to get a location of the camera and then dropped the composite image into a GIS as a theme. The result? When you click on a roadway intersection located on the GIS map you are able view a continuous panoramic picture completely around the intersection as if you were standing in the center of it looking outward. At times integration of existing technologies can yield amazing results with little effort!

I hope that you find these nuggets helpful.

In conclusion, I would like to leave you with a quote from Theodore Roosevelt that I have hanging by my desk. I have read it many times in the midst of technology integration projects. It reads,

It is not the critics who count; not those who point out how the strong stumble, or where the doers of deeds could have done them better. The credit belongs to the people who are actually in the arenas, whose faces are marred by dust and sweat and blood; who strive valiantly; who err, and come short again and again, because there are no efforts without error and shortcoming; but who do actually strive to do the deeds; who know the

great enthusiasms, the great devotions: who spend themselves in a worthy cause, who at the best know in the end the triumph of high achievement, and who at the worst, if they fail, at least fail while daring greatly, so that their place shall never be with those cold timid souls who know neither victory nor defeat. *Theodore Roosevelt.*

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